SEVENTH
~~7TH~~ STREET BRIDGE
Spanning the Chicago, St.Paul,
Minneapolis & Omaha Railroad
at 7th Street
Hudson
St. Croix County
Wisconsin

HAER No. WI-13

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
Department of the Interior
P.O. Box 25287
Denver, Colorado 80225-0287

HAER
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HISTORIC AMERICAN ENGINEERING RECORD
SEVENTH ~~7TH~~ STREET BRIDGE

HAER NO. WI-13

Location:	Spanning the Chicago, St. Paul, Minneapolis & Omaha Railroad tracks at 7th Street in the city of Hudson, St. Croix County, Wisconsin.
UTM:	15:519750:4981090
Quad:	Northline, Wisconsin (7.5-minute series)
Date of Construction:	1910
Designer and Builder:	Chicago, St. Paul, Minneapolis & Omaha Railroad
Present Owner:	None
Present Use:	Demolished in 1987
Significance:	The 7th Street Bridge was one of two remaining Howe truss bridges in Wisconsin identified in a 1981 survey. The other example was the Old Wells Road Bridge, which was also built by the Chicago, St. Paul, Minneapolis & Omaha Railroad Company. In addition to these two trusses, there were three other wood and metal combination trusses extant in the state in 1981. In 1993, only one king post truss and one queen post truss survive.
Project Information:	In 1986, the documentation of the 7th Street Bridge was begun by Bonestroo, Rosene, Anderlik & Associates of St. Paul, Minnesota. In 1993, Amy A. Ross, Architectural Historian at Mead & Hunt, Inc., and Robert S. Newbery, Wisconsin Department of Transportation Staff Historian, completed this report.

History of St. Croix County

The first settlement in the area that became St. Croix County was at the confluence of the Willow and St. Croix Rivers. In the mid-1840s, four men—Louis Massey, Peter Bouchea, W. Steets, and Joseph Sauperson—and their families settled land that is now part of the city of Hudson. In 1847, the first sawmill and dam were built at the mouth of the Willow River. Hudson's earliest residents were associated with the lumber industry, drawing timber from the vast acreage of pine in the St. Croix Valley.

Two adjoining villages, Buena Vista and Willow River, were platted in this vicinity in 1848 and 1850, respectively. In the winter of 1851-52, these two separate entities united to become the city of Willow River. The city received a municipal charter in 1857 and changed its name again, to Hudson.[1] In 1865, Hudson had a reported population of about 4,500.

Located 19 miles east of St. Paul, Minnesota, the city was the St. Croix County seat.[2] The St. Croix River, probably Hudson's greatest asset during this early period, provided a transportation link to distant markets, an export channel to ship raw materials and lumber products, and power to operate mills.[3] In 1871, two railroad lines—the West Wisconsin Railroad and the North Wisconsin Railways—reached Hudson; both located their head offices there. The city of Hudson laid conveniently along a route that directly connected Chicago and St. Paul. Though Hudson's population had dropped to about 3,000 by 1876, the recently acquired railroad service promised a bright future. As lumbering declined toward the end of the nineteenth century, agriculture and the industries associated with the railroad began to flourish.[4]

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[1] Augustus B. Easton, ed. History of the Saint Croix Valley (Chicago: H.C. Cooper, Jr. & Co., 1909) 790-94.

[2] Wisconsin and Minnesota State Gazetteer...for 1865-66 (Indianapolis: Geo. W. Hawes, Publisher and Compiler, 1865) 25.

[3] Richard C. LaRowe, Hudson and North Hudson, Wisconsin: An Intensive Survey of Local Architectural and Historical Resources (Madison, Wisc.: State Historical Society of Wisconsin, 1984) 33.

[4] Wisconsin State Gazetteer and Business Directory for 1876-7 (Milwaukee: The Sentinel Company, 1876).

Bridges became the connecting link in Hudson's development as a prosperous rail center. The 1871 advent of the West Wisconsin Railroad had accentuated the need to span the St. Croix and Willow Rivers and join the expansive network of tracks that stretched across the country. Accompanying the arrival of the railroad, West Wisconsin built a draw span across Lake St. Croix and, in doing so, secured an entrance into St. Paul.[5] Several trestles were built across the Willow River, now Lake Mallalieu. In 1873, a massive wood bridge was constructed at the north end of Fourth Street. (A similar structure was built in 1935 over the convergence of Lake Mallalieu and the St. Croix River.[6])

In 1872, the West Wisconsin Railroad relocated its car construction and repair shops from Eau Claire to North Hudson. After the 1878 purchase of the West Wisconsin Railroad Company, the Chicago, St. Paul, Minneapolis & Omaha Railroad, relocated its locomotive repair operations to Shakopee, Minnesota, in 1881 (the operation ended up in St. Paul the next year). However, car operations remained at Hudson.[7] New shops were erected with a substantial capacity increase in 1891 to replace those that had burned a couple of years earlier. The city was prospering by the turn of the century as home to the railroad car repair operations.

By 1900, Hudson's population had stabilized at just over 3,000 residents. The thriving town offered electricity, waterworks, an opera house, churches for eight denominations, and two weekly newspapers. The railway car shops, as well as two breweries, a sawmill, and two factories, contributed to a booming economy.[8] In 1911, Hudson could boast of a Carnegie public library and sewerage, in addition to their earlier amenities.[9] The 1920 census found Hudson's population holding steady at around 3,000.[10] Called the "lifeblood" of twentieth-century Hudson, the rail industry continued as the area's leading economic influence for the first decades of the century. However, a severe decline in this industry began in the 1940s and ended with the railroad car shops being abandoned in 1957.[11] In recent years, Hudson has become entwined in the economic structure of the nearby Minneapolis-St. Paul metropolitan area.[12]

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[5] LaRowe 28.

[6] LaRowe 29.

[7] Miller 56-57.

[8] Wisconsin State Gazetteer and Business Directory for 1901-02 (Chicago: R.L. Polk & Co., 1901) 426.

[9] Wisconsin State Gazetteer and Business Directory for 1911-12 (Chicago: R.L. Polk & Co., 1911). Railroad service was still provided by the C., St. P., M. & O. Railway.

[10] Wisconsin State Gazetteer and Business Directory for 1921-22 (Detroit: R.L. Polk & Co., 1921) 385.

[11] Miller 55; LaRowe 39.

[12] LaRowe 26-27, 50.

History of the Railroads

The rapid expansion of railroads throughout Wisconsin during the late nineteenth century brought economic prosperity to many communities.[13] Wisconsin communities were eager to obtain railroad service to facilitate the transfer of local goods to Eastern markets. In 1863, the short-lived Tomah and Lake St. Croix Railroad Company was organized by several prominent men in west-central Wisconsin to connect these termini. Construction on the railroad began in 1867, and the line reached Eau Claire in 1870. However, the Tomah and Lake St. Croix line had been taken over by the West Wisconsin Railroad Company in 1866. Thus, it was the West Wisconsin Railroad that reached Hudson in 1871.[14] In this year, Hudson became linked by rail to both St. Paul, Minnesota and Tomah, Wisconsin.[15]

The West Wisconsin rail system fell upon financial difficulties in 1878 and was sold to the Chicago, St. Paul & Minneapolis Railroad, which had been organized that year by a group of businessmen. The latter became the Chicago, St. Paul, Minneapolis & Omaha Railroad after an 1880 merger with the North Wisconsin Railway Company. Known as the "Omaha Road," the company incorporated in Wisconsin in May 1880. At this time, it was a small railroad owning less than 300 miles of track, all of which was located in Wisconsin, as its Minnesota operations were still conducted over leased track. For a brief time, the company was headquartered in Hudson but was moved to St. Paul in 1880.[16] The Omaha Road grew quickly as a result of the merger of approximately 30 grants and legislative authorizations. In 1882, the majority of its stock was purchased by the Chicago-Northwestern Railway Company. However, the Chicago, St. Paul, Minneapolis & Omaha Railroad continued to operate under its own name until 1925 and retained a corporate existence until 1972.[17]

The great Chicago-Northwestern Railway Company was the result of a series of constructions, consolidations, mergers, purchases, and unions of 100 smaller railroad companies that occurred over many years. Chicago-Northwestern had its beginnings in the Illinois and Wisconsin Railroad Company, chartered in 1851 to operate from Chicago to Deer Grove, northwest of the

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[13] Barbara Wyatt, ed., Cultural Resource Management in Wisconsin, Vol. 2 (Madison, Wisc.: State Historical Society of Wisconsin, 1986) 6-2. For the history of the development of railroads throughout Wisconsin, see William F. Raney, "The Building of Wisconsin Railroads," 19.4(1936): 387-403.

[14] "Register of the Chicago, St. Paul, Minneapolis & Omaha Railroad—Eau Claire Depot Records, 1880-1969," ms., 1986 (copy at State Historical Society of Wisconsin, Archives Division). This short report summarizes the 28 box collection that is held at the UW-Eau Claire Area Research Center.

[15] See Easton 794; Willis Harry Miller, This Was Hudson (Hudson, Wisc.: Star-Observer Publishing Co., 1955) 54-55.

[16] Miller 55-56.

[17] The track laid by the Omaha Road (1882-1925) covered 1,648 miles; "Register."

city. Three years later this company consolidated with three small Wisconsin railroads and incorporated as the St. Paul and Fond du Lac Railroad Company. In 1859, further additions and consolidation brought about the formation of the Chicago-Northwestern Railway Company. The original tracks operated by Chicago-Northwestern ran from Chicago to Green Bay.

In 1864, Chicago-Northwestern merged with the Galena & Chicago Union Railroad Company, which was chartered in 1836 and, a decade later, became the first railway to operate out of Chicago. Although Chicago-Northwestern was a smaller, newer, and less prestigious rail company than Galena & Chicago Union, Chicago-Northwestern gave its name to the new conglomerate because no portion of the consolidated railroads touched Galena. In addition, the directors thought this name would better represent the territory served by the new company. Road building was almost ceaseless throughout the 1860s–1880s as Chicago-Northwestern tracks spread out from Chicago toward the west and northwest in a gigantic fan—reaching across Nebraska, South Dakota, Iowa, Minnesota, and to almost every part of Wisconsin.[18] In 1882, the Chicago-Northwestern purchased the network of tracks developed by the Omaha Road, which extended in a great curve from Elroy, Wisconsin, northwest, then west to St. Paul and Minneapolis, and then southwest to Omaha. These tracks accounted for 1,147 miles.[19] Operated under the Chicago, St. Paul, Minneapolis & Omaha Railroad name until the mid-twentieth century, these tracks covered all of northwestern Wisconsin and included those entering the city of Hudson.[20]

History of Construction

Built in 1910 by the Chicago, St. Paul, Minneapolis & Omaha Railroad, the 7th Street Bridge crossed over this company's tracks. The bridge replaced an at-grade crossing and facilitated vehicular and pedestrian access to the city's oldest hospital, which had been erected at the north end of 7th Street in 1887. Originally called the Oliver Wendell Holmes Hospital, the facility was renamed in 1894 and thereafter known as the Sanatorium. In 1910, the Sanatorium was the only building in the area; thus, the bridge's sole purpose would have been to serve hospital residents.[21] In August 1910, Minneapolis capitalist, William Campbell, bought the Sanatorium from E.B. Bradford, who continued to act as medical advisor to the institution.[22]

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[18] "A Brief History of the Chicago and North Western Line" 3-12.

[19] Raney 396.

[20] Thirty-ninth Annual Report of the Chicago, St. Paul, Minneapolis & Omaha Railroad (N.p.: 1920).

[21] Platbook of Saint Croix County, Wisconsin (N.p.: Pinkney & Brown, 1897).

[22] "Sanatorium is Sold," Hudson Star-Observer 25 August 1910.

The eastern division of the Omaha Road, of which Hudson's tracks were a part, underwent major improvements starting in 1907 and 1913. Improvements included reshaping of the right-of-way, elimination of sharp curves, and the replacement of grade crossings with underpasses and overhead highway bridges. It is likely that the replacement of an at-grade crossing with the 7th Street Bridge was part of this project.[23] In 1910, the Omaha Road owned and operated about 766 miles of track in Wisconsin, including the line over which the 7th Street Bridge crossed, and 60 miles of secondary track.[24]

The 7th Street Bridge was a 120-foot, seven-span structure. The bridge consists of three short, timber-deck girder spans on each side of a central 38-foot Howe truss span. The structure was composed of massive wood beams averaging 6 square inches. The roadway width was 18'-5" and the overall width was 19'-7". The bridge had a timber deck, curb, and railings.

History of Howe Truss Bridges

William Howe (1803–1852), an inventor, was commissioned by the Boston and Albany Railroad in 1838 to build a timber railroad bridge of a new design. Patented in 1840, the Howe truss marked the beginning of the transition from wood to iron for railway and highway bridges. Though similar to the Long truss, which was popular for road and rail bridges in the 1830s, the Howe truss was distinguished by the replacement of the timber tension verticals with wrought-iron rods.[25] In Howe trusses, the lower (tension) chord, upper chord, and web diagonal struts were constructed of heavy timber, while the web verticals, in tension, were formed of wrought-iron rods with ends threaded to take nuts that bore against the chords. Lateral tie rods, joint castings, splicing members, and bolts were also made of iron.

The Howe truss soon became popular wherever good-quality timber was readily available.[26] This truss is statistically determinate and, thus, simple to design. It is equally straightforward in

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[23] Miller 58.

[24] Twenty-ninth Annual Report of the Chicago, St. Paul, Minneapolis & Omaha Railway Company (N.p.: 1910) 21.

[25] Emory L. Kemp, West Virginia's Historic Bridges (West Virginia Department of Culture and History, West Virginia Department of Highways and the Federal Highway Administration, 1984) 59.

[26] See J.B. Johnson, C.W. Bryan and F.E. Turneaure, The Theory and Practice of Modern Framed Structures (New York: J. Wiley & Sons, Inc., 1905); William H. Burr and Myron S. Falk, The Design and Construction of Metallic Bridges (New York, 1912); Milo S. Ketchum, The Design of Highway Bridges (New York: McGraw-Hill, 1908); J.A.L. Waddell, Bridge Engineering (1st ed., 1916; New York: J. Wiley & Sons, 1925).

its detailing and erection. In addition, the truss could be adjusted and members replaced while remaining in service. For these reasons, it quickly became the standard for railroad bridges at the end of the century, flourishing to the point of near exclusion of all other types where wood was abundant. Examples for highway use were built well into the twentieth century.[27]

In their 1905 textbook, The Theory and Practice of Modern Framed Structures, J.B. Johnson, et al., devoted an entire chapter to the Howe truss. The chapter, *The Detail Design of a Howe Truss Bridge*, begins with the statement: "The Howe truss has proved the most useful style of bridge ever devised for use in a new and timbered country." Said to be in regular use for both highway and bridge purposes, the bridge is lauded as easily built and very cheap.[28] A 1917 article in Engineering and Contracting, noted that the covered Howe truss bridge was still in extensive use in Oregon for stream crossings on secondary highways and for interurban transportation on electric railway systems in the Pacific Northwest. A contemporary bridge manual issued by the Oregon Highway Commission provided a standard plan for a Howe truss. Oregon's state engineer stated that, when properly covered, Howe trusses will last 30 to 40 years.[29] In 1925, J.A.L. Waddell listed the Howe truss among what he considered "antiquated" designs, but noted that "today it is recognized as the ideal truss form for wooden bridges." He stated that "the Howe truss is still used for wooden bridges on railroads of light traffic that are located far from the centres of civilization, where metal is necessarily expensive and timber is cheap..."[30]

Statewide bridge surveys conducted in three western states, Montana, Colorado and Washington, identified a number of combination or timber truss bridges including examples of the Howe type. In Montana, the first large railroad trusses and highway bridges were wood Howe trusses. Many references are made to Howe trusses in early county bridge records, and good photographs of early examples can be found. However, with the railroads came eastern bridge builders and different truss types. Wood and iron combination Pratt trusses soon became common in Montana. Fourteen surviving examples of the Pratt type have been identified in the state. After 1900, Montana bridge builders, like those elsewhere in the United States, settled on the Warren truss and the Pratt truss as the most efficient forms.[31]

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[27] "The Howe Truss Lives," Society of Industrial Archeology, Newsletter, Jan. 1979. The current status of these structures is unknown.

[28] Johnson 585-90.

[29] "Plans and Estimates for Howe Truss Bridges," Engineering and Contracting 47.17 (1917): 401-02.

[30] Waddell 20, 468, 492. Waddell's characterization of this type of truss as "antiquated" may be explained by the rise in popularity of concrete for short highway spans during the 1920s.

[31] Frederic L. Quivik, Historic Bridges of Montana (U.S. Department of the Interior, National Park Service, Historic American Engineering Record, 1982) 44-47.

In Colorado, the Howe pony truss and the King Post and Queen Post trusses were the most common early timber truss forms used for vehicular bridges. Once well-represented throughout the state, only one example of a Howe truss still stands in Colorado. The Wheeler Bridge (1924) is a well-preserved late example of this type.[32] With two 55-foot spans, the structure was patterned after the early timber/iron State Bridge over the Rio Grande near Wagon Wheel Gap. The State Bridge was erected in 1899 by the Pueblo Bridge Company.[33]

The state of Washington used timber trusses as part of a transportation system that accessed logging and mining interests in remote areas. The earliest known bridge associated with the development of these industries is a timber-deck Howe truss built in 1896 as part of the Red Mountain Railroad, which ran between Northport and Rossland and linked the untapped Canadian mineral deposits in the Kootenay district to smelters in the United States. The earliest extant bridge associated with the logging industry was also a timber-deck Howe truss. The Winslow Railroad Bridge was constructed in 1916–17 by the Winslow Lumber Manufacturing Company as part of a 25-mile track system used to transport logs to the company's mill in Orin. Timber continued to be used to construct railroad bridges throughout Washington during the first quarter of the twentieth century due to the abundance of this resource. The use of treated timber extended the life of these structures. The Milwaukee Railroad employed a standard design, constructed by company forces, for its bridges. All were Howe through trusses, approximately 150 feet long. A 1979 survey found only two examples remaining in the state. Two examples of combination bridges using the Pratt truss configuration were also identified in this study.

In addition, four Howe truss covered bridges remain in Washington. The oldest is a two-span highway bridge constructed across Grays River in 1905, and the latest is a short-spanned truss covered with corrugated metal constructed across the Chehalis River in 1934. To extend the life of timber members, the Milwaukee Road, in particular, often built housing around the trusses. One example of a covered Howe truss that was built by the Milwaukee Road survives.[34]

Although they once numbered in the thousands, few Howe railroad trusses survive today—a consequence of the limited life of even treated timber. Many of the surviving Howe trusses were constructed much later than the late nineteenth-early twentieth century heyday of this type. One extant group that was built at a fairly late date, probably around 1930, is the transfer bridges at the once-important Port Richmond coal terminal of the Philadelphia & Reading Railroad on the Delaware River north of the city of Philadelphia. These short spans provided access to railroad car ferries and floats and are pivoted at the land end, with the water end carried by a hoist to

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[32] According to the 1986 study this bridge was extant and serving light traffic on a private drive; see Rebecca Herbst and Vicki Rottman, eds., Historic Bridges of Colorado (N.p.: Colorado Department of Highways, 1986) 107.

[33] Herbst and Rottman 107.

[34] "Historic Bridges and Tunnels in Washington State," National Register of Historic Places, Nomination Form (State Office of Archeology and Historic Preservation, April 1980).

accommodate for tidal variations. This type of timber construction was likely selected because the Howe truss could be erected with the company's own timber, in its own shop, and by its own crew.[35]

Because of the limited life span of their timber members, combination bridges have become as rare in Wisconsin as they have in other states. The 7th Street Bridge was one of two remaining Howe truss bridges in Wisconsin identified in a 1981 survey. The other example was the 1911 Old Wells Road Bridge, which was also built by the Chicago-Northwestern Railroad Company and was nearly identical in appearance to the 7th Street Bridge.[36] Both bridges have since been demolished. In addition to these two Howe trusses, three other wood and metal combination trusses were extant in the state in 1981—two king post trusses and one queen post truss. Both king post examples were in the town of Port Wing in Bayfield County; one has since been demolished.

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[35] "The Howe Truss Lives."

[36] Another Chicago Northwestern-built Howe truss once carried Mill Street over the tracks in Hortonville. This wood bridge was replaced in 1911 by a riveted lattice span. See Larry E. Easton, "The Trail of Old Kate," Northwestern Lines 4.3 (1977): 20.

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Fig. 1 USGS Quad: Northline, Wisconsin (7.5-minute series)
UTM: 15:519759:4981090